

REMARKS

Claims 5-7, 10-16, 25-26, and 30-46 will be pending upon entry of the present amendment. Claims 5-7, 10-16, and 25-26 and 30-33 were allowed. Claims 1-4, 8-9, 17-24 and 27-29 were previously canceled. Claims 34 and 42 are being amended. Claims 45 and 46 are new. No new matter is introduced by way of this amendment.

Claims 5-7, 10-16, 25-26 and 30-33

Claims 5-7, 10-16, and 25-26 and 30-33 were allowed in the present Office Action. These claims have not been amended, and are thus still in allowable form.

Claims 34-46

Each of claims 34-44 recites features and/or functionality that are not taught or suggested by the prior art, and are thus also allowable. In the present Office Action, the Examiner rejected claims 34-44 as obvious over Lee ("Target Bit Matching for MPEG-2 Video Rate," IEEE) in view of one or more of: Oikawa (U.S. Pat. No. 5,677,734), Pullen (U.S. Pat. No. 5,923,376), Wu (U.S. Pat. No. 6,947,378), and Boice (U.S. Pat. No. 5,644,504). However, as discussed below, each of the claims includes features and/or functionality not taught or suggested by any of these references.

For example, independent method claim 34 as amended recites, in part (emphasis added):

determining a relationship between first metric values and respective quantities of encoded video data, the first metric values generated by encoding reference video data from a reference video, the reference video including a plurality of macroblocks, using a metric function and respective first encoding parameters;

after determining the relationship, . . .

receiving an input video, the input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video;

generating second metric values from input video data of the input video using respective second encoding parameters;

selecting at least one of the second encoding parameters based on a desired quantity of encoded video data and the relationship between the first metric values and the respective quantities of encoded video data; and

encoding the input video data using the selected at least one encoding parameter.

Thus, independent claim 34 generally includes, among other things, determining a relationship between first metric values and respective quantities of encoded video data based on a reference video including a plurality of macroblocks. This determined relationship is later used as part of selecting an encoding parameter for encoding video data of an input video, where the input video includes a plurality of macroblocks distinct from the plurality of macroblocks of the reference video.

Conversely, Lee describes a bit rate control algorithm that determines quantization parameters for a current macroblock based on a previous macroblock of the same video (i.e., of the same plurality of macroblocks) that is being encoded. Lee emphasizes this point repeatedly: “The proposed algorithm uses the relationship between the number of actual coding bits and the number of estimated bits of the previous macroblock”; (*Id.* at Abstract, p. 66) “When we estimate the number of coding bits for the current macroblock, we consider both the activity and the coding mode of the previous macroblock”; (*Id.* at Section 5, p. 69) “We can exploit the relationship between the number of actual coding bits, BIT_{actual} , and the number of estimated coding bits, $BIT_{estimated}$, of the previous macroblock”; (*Id.* at Section 3.3, p. 67) and “For a more accurate estimation of coding bits for the current macroblock, we examine the number of actual coding bits and the number of estimated bits for the previously encoded macroblocks . . .” (*Id.* at p. 68).

In particular, in the first paragraph of page 4 of the present Office Action, the Examiner alleges that Lee discloses the element, “receiving an input video distinct from the reference video” in Figure 1 of Lee. Figure 1 of Lee “explains a procedure of determining the quantization step size adaptively” (*Id.* at p. 68) including determining the quantization factor for the current macroblock i (Q_i) by taking as input a reference quantization parameter Q_{ref} for the

current macroblock and a difference (Δ) between the actual number of coding bits (BIT_{actual}) and the number of estimated coding bits, ($BIT_{estimated}$) of the previous macroblock (see Figure 1 of Lee on p. 68) of that video sequence. There is no “input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video” being received.

In other words, Lee uses previously encoded macroblocks of the same video as part of its encoding algorithm, and does not teach or suggest using any other video apart from the video that is being encoded. Thus, Lee does not describe an “input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video.” Lee simply does not teach or suggest using two distinct videos each including two distinct pluralities of macroblocks as part of its bit rate control algorithm.

However, even if Lee did teach or suggest, “input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video,” Lee still does not teach or suggest “generating second metric values from input video data of the input video using respective second encoding parameters.” The Examiner alleges that this element is disclosed by Lee because, as the Examiner states on page 4 of the present Office Action, “Lee discloses to use the bit rate control parameter with respect to the quantization control parameter.” Although the value of the particular quantization parameter for a macroblock of Lee may be determined based on the bit rate control parameter, the quantization parameter of Lee is also generated based on the metric value of the current block. In particular, the spatial activity metric value (N_{actj}) of Lee for a macroblock of a particular video stream is used as the scaling factor γ_i in determining the reference quantization factor q_i (i.e., encoding parameter) for that macroblock. See the excerpt below from page 67, Section 3.2, of Lee:

For estimating the reference quantization parameter for each macroblock, we define the following equation based on rate distortion theory [2]:

$$q_i = 2^C \times \gamma_i$$

where C is a parameter that controls bit rate, and γ_i is a scaling factor which characterizes the properties of the current macroblock.

...

We may use N_{actj} as the scaling factor γ_i for macroblock i .

Thus, Lee describes generating the encoding parameter for each macroblock using the metric value of that macroblock (while not distinguishing between first and second encoding parameters), as opposed to “generating second metric values from...using...encoding parameters,” as recited in claim 34. Accordingly, for at least these reasons, Lee does not teach or suggest “generating second metric values from input video data of the input video using respective second encoding parameters”

Next, the Examiner alleges that Lee discloses “selecting at least one of the second encoding parameters...” Applicants respectfully disagree. As shown above, Lee describes generating a specific encoding parameter for each macroblock using the metric value of that macroblock and a difference (Δ) between the actual number of coding bits and the number of estimated coding bits of the previous block, but does not describe any further “selection” step to select from among the generated encoding parameters after they are generated.

In addition, claim 1 states, “first metric values,” are “generated by encoding reference video data from a reference video,” and the “second metric values” are generated “from input video data of the input video” (emphasis added). As shown above, Lee does not describe an “input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video.” (emphasis added). Thus, Lee cannot describe “first metric values” and “second metric values” generated as recited in claim 1. For at least these reasons, Lee does not teach or suggest “selecting at least one of the second encoding parameters based on a desired quantity of encoded video data and the relationship between the first metric values and the respective quantities of encoded video data.”

None of the other references appears to teach or suggest features that are missing from Lee. In particular, Oikawa generally describes a method of modifying the quantization step of each macroblock of a video segment using a first quantization step decision circuit and a second quantization step decision circuit to modify the quantization number for each macroblock so that the quantity of quantized data is below a bit budget, but does not include anything related to “determining a relationship between first metric values and respective quantities of encoded video data” based on a reference video and using such a determined relationship as part of “selecting . . . encoding parameters” for encoding an input video that is distinct from the

reference video. Furthermore, neither the compression method of Pullen, nor the dynamic allocation of network resources of Wu appears to teach or suggest such features recited by claim 34.

Thus, for at least these reasons, Applicants respectfully submit that independent claim 34 is allowable over the relied-upon references.

Dependent claims 35-41 and 45 depend directly or indirectly from independent claim 34, and are thus allowable on the basis of this dependency. In addition, the dependent claims recite additional features and/or functionality not found in the prior art, and are thus also allowable for these additional features and functionality. For example, dependent claim 35 recites, in part, "storing the relationship for use in the selecting at least one of the second encoding parameters based on the desired quantity of encoded video data and the relationship"; and dependent claim 36 recites that "the determining the relationship between first metric values and respective quantities of encoded video data is performed as part of a calibration process." Other dependent claims include features and/or functionality not found in the prior art, although such are not enumerated here for the sake of brevity.

Although the language of claim 42 is not identical to that of claim 34, claim 42 has language similar to claim 34 and thus is allowable for at least similar reasons to those set forth above with respect to claim 34.

Dependent claims 43-44 and claim 46 depend from independent claim 42, and are thus allowable on the basis of this dependency. In addition, the dependent claims recite additional features and/or functionality not found in the prior art, although such are not enumerated here for the sake of brevity.

Conclusion

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

All of the claims remaining in the application are now clearly allowable.
Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,
SEED Intellectual Property Law Group PLLC

/Jeremiah J. Baunach/
Jeremiah J. Baunach
Registration No. 44,527

JJB:lj|

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

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